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Patent Law, 5727 - 1967

בקשה לפטנט

Application for Patent

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תהליך למיצוי מרכיבים חיוניים מצמחים

(באנגלית) (English)

PROCESS FOR EXTRACTING VITAL COMPONENTS FROM PLANTS

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PROCESS FOR EXTRACTING VITAL COMPONENTS FROM PLANTS

PROCESS FOR EXTRACTING VITAL COMPONENTS FROM PLANTS

Field of the invention

The present invention relates in general to the field of cosmetics, foodstuff, nutraceutical and pharmaceutical compositions. More particularly, the present invention relates to a process for separating between, and sterilizing, liquids and solids of plants while preserving essentially most of the original quality of the secondary metabolite substances produced by the plants.

Background of the invention

Currently there are technologies for extracting useful components from plants, which are well known and largely exploited on a daily basis. For example, substances from plants belonging to the labiatae family have been extracted to provide antioxidants (e.g., US 6,383,543 to Reznik). Other substances are extracted from other plants, which are exploited in anti-inflammatory, antiallergic and cosmetic applications (e.g., US 6,060,061 to Breton et al.). It is also well known that essential oils extracted from plants of the labiatae family are useful as food flavorings (e.g., US 6,306,450 to Bank et al.). The contents of the aforementioned US patents, including references cited therein, are incorporated herein by reference.

It will be appreciated by persons skilled in the art, that useful substances, such as those mentioned above, exist in plant extracts, where the extraction has been made for example by use of water or ,organic solvents. In such extraction processes, the insoluble plant residues loose considerable portion of their original healthy secondary metabolite characteristics, and, therefore, are plant's solid residues generally believed to have little value and are discarded, or at most are used for animal feed. By 'secondary metabolite' it refers to special substances that are uniquely produced by each species of plants, which substances contain

unique useful ingredients, such as vitamins, minerals, anti-oxidant agents, and other useful and vital compounds.

However, the present inventors have surprisingly found that such generally discarded plant residues, which remain after removal of the liquid phase extracts, are themselves of cosmetic, food, nutraceutical and pharmaceutical significance. Moreover, the separation between liquids and solids of plants, as disclosed in the present invention, together with a sterilization process, which is also disclosed in the present invention, were found to be helpful in preserving the original healthy secondary metabolite characteristics of the extracted liquids and of the solids residues of plants.

Summary of the invention

The present invention provides a process for separating between, and sterilizing the, liquids and solid substances of whole plants or selected parts of plants. The sterilized liquids and solid products are intended to be utilized as ingredients for cosmetics, food stuff, nutraceutical and pharmaceutical compositions.

By 'bioextract' it is meant herein to the stuff obtained immediately after crushing frozen plants, or parts thereof. The stuff is a mixture that contains the liquids and solid substances of the crushed plant(s).

Preferably, the process for separating between liquids and solid substances of whole plants or parts of plants comprises; fast deep-freezing the plant(s) or parts thereof (by immersing the plant(s) in liquid nitrogen or other cold liquids or gases); crushing the whole deep-frozen plant(s), or parts thereof; defrosting the resulting bioextract mixture so as to allow draining the liquids from the defrosted bioextract; and separating between the liquids and the solid substances of the defrosted bioextract mixture, preferably by squeezing the liquids off the bioextract by employing high pressure thereon.

In connection with the above-mentioned crushing stage, it has been found that crushing plants, or parts thereof, which have been deep-freezed prior to the crushing stage, resulted in having particles that are much smaller than the particles that could have been obtained by utilization of conventional crushing methods (i.e., methods that do not include deep-freezing the plants, or parts thereof), because a deep-freezed substance tends, when a crushing force is exerted thereon, to disintegrate into many tiny pieces, essentially in a similar manner like a broken glass. As a result of this, more liquid can be extracted from plants, which has several consequences: a given quantity of plant(s), or parts thereof, yields more liquid, in comparison to conventional separation methods, and the resulting solids residues are, therefore, drier, which normally extends their lifespan. Both consequences are of considerable economical significance.

It has also been found, that a preceding stage of deep freezing of the whole plant, or parts thereof, imparts to the resulting separated liquids and solid substances considerable degree of sterilization, as illustrated in the experiments that are described below.

Preferably, the separated liquids are filtered and further sterilized, and the solid substances, which contain essentially the original richness of mineral content (due to the freezing step in the separation process), are ("cold") sterilized and homogenized by comminuting the solid residues to an average particle size of no more than about 0.6 micron. The (cold) sterilization process, which is employed on the separated liquids and solids substances, comprises one or more "freeze-defrost" cycle(s), each of which includes one fast deep-freezing of the liquid(s) and solid substances followed by one fast defrosting of the frozen liquids/solids.

Preferably, in each freeze-defrost cycle the liquids/solids substances are kept frozen in a temperature within the range $-160^\circ C \div (-197^\circ C)$ for a

period of 10 seconds, after which the frozen liquids/solids are fast defrosted to a temperature within the range $15^\circ C \div 20^\circ C$, by immersing them in hot liquid, such as water, the initial temperature of which is between $80^\circ C$ and $90\ ^\circ C$.

In each cycle of the sterilization process, the liquids/solids substances are frozen by utilizing liquid nitrogen, or other suitable medium.

The sterilized liquids and/or solids substances could be utilized as ingredients in cosmetic, food, nutraceutical and pharmaceutical compositions by mixing them with at least one intermediator (e.g., acceptable carrier, diluent, adjuvant or excipient), or without utilizing any intermediator, in which case the sterilized liquids and/or solids substances could be utilized as a concentrated product.

The process for separating liquids from solids substances in whole plants or parts of plants could be further characterized by at least one of the following features:

a) At least one of the plants belongs to the labiatae family;
b) At least one of the plants is selected from the group of: Lavandula, Melissa, Mentha, Ocimum, Origanum, Preslia, Rosmarinus, Salvia, Thymus;
c) Leaves and/or shoots of the plant(s) are processed together with, or separately from, roots thereof; and
d) The mixing stage is preceded by washing the solids substances with a solvent selected from water and organic solvents, and the washed solids are subjected to homogenization and/or dehydration by freezing.

The present invention provides also a process for making cosmetic, food, nutraceutical or pharmaceutical compositions, which process comprises the steps of: removing the liquids from whole plants, or parts of plants, after separating between the liquids and solids substances in the way described above (i.e., by freezing, crushing, etc.), and mixing the residual

solids substances, in particular the cell wall, with at least one cosmetically or pharmaceutically acceptable carrier, diluent, adjuvant or excipient.

According to an aspect of the present invention, the separated liquids and/or solid substances are utilized for making a beverage, by mixing the liquids and/or solids with at least one intermediator, such as diluent and/or other ingredient suitable for human, or animal, consumption, or without mixing the liquids/solids with an intermediator, in which case the sterilized liquids and/or solids substances could be utilized as a concentrated product.

The present invention also provides cosmetic, food, nutraceutical or pharmaceutical composition, which comprises a natural mineral-rich plant tissue(s) component(s). The tissue(s) component(s) are obtainable by: deep-freezing whole plant(s) or parts thereof; crushing the frozen whole plant(s) or parts thereof until they become a powder that has particles' size within the range of 0.5-2 micron; defrosting the crushed product so as to allow draining liquids from the resulting bioextract; separating between said liquids and the solid substance of the bioextract; and, mixing solid residue(s) together with at least one acceptable carrier, diluent, adjuvant or excipient.

Preferably, at least one of the plants, which are utilized for making cosmetic, food, nutraceutical or pharmaceutical composition, belongs to the labiatae family.

According to an aspect, the composition(s) contains at least one plant that is selected from Lavandula, Melissa, Mentha, Ocimum, Origanum, Preslia, Rosmarinus, Salvia and Thymus.

According to another aspect, the composition(s) includes chlorophyll, for protecting a skin.

Preferably, the whole plant(s), or parts thereof, are frozen by utilizing liquid nitrogen or liquid oxygen.

According to one embodiment of the present invention, the solids and/or liquids of plants, or of selected parts of plants, which are separated from one another in the way disclosed in the present invention, are utilized, wherever required, as natural colorants, flavors and/or aromatics.

Detailed description of the invention

After separating between the liquids and solid substance of a plant, or of selected parts thereof; i.e., by extracting the liquids from the plants, the extracted liquids and solids residues are useful in the foods industry (i.e., for flavoring and coloring foods), and in the cosmetic and medicine industry.

Medical virtues of plants belonging to the labiatae family are known from scientific literature and may be exemplified by those mentioned in the above cited US Patents Nos. 6,383,543 and 6,060,061. Depending on the preferred compositions, plants may be selected from Lavandula, Melissa, Mentha, Ocimum, Origanum, Preslia, Rosmarinus, Salvia and Thymus. Especially presently preferred are, illustratively, Melissa officinalis L. (lemon balm), Mentha longifolia L. (horse mint), Ocimum basilicum L. (basil) and Salvia fruticosa (Greek sage) e.g Salvia fruticosa Miller.

The useful ingredients of the plant solid's residues, which follow separation of the liquids constituents of the plants (including solid ingredients which dissolve in the liquid phase), are health-promoting organic elements (in combined form) such as, in particular, calcium, magnesium, potassium, iron, phosphorus and sulfur, while the green parts of the plants contain chlorophyll and the solid residues contain membrane proteins integrated into plant cells membranes.

In general, cosmetic compositions contain beauty compositions as well as skin protective compositions that contain plant tissues of green leaves and/or shoots, and the plant residue comprises (besides other possible components) antioxidant(s) and chlorophyll.

The nutraceutical and pharmaceutical compositions may be formulated in unit dosages, as is well known in the art, in which case the adjuvant ingredients may include (but are of course not limited to) a coating such as an enteric coating. The nutraceutical and pharmaceutical compositions may be formulated for, e.g., oral, parenteral, rectal, topical or transdermal administration use.

Foods compositions of the invention could include, for example, juice bioextract, beverages in general, and yogurts, to which extracted liquid(s) and/or solids and/or all plant tissues could be added. The actual final composition would depend on the required results. For example, Melissa may be useful in improving sleeping and memory, as well as a relief for Alzheimer.

It should be noted that, depending on the components and properties desired in the final product, the process for making a cosmetic, food, nutraceutical or pharmaceutical composition, could include processing leaves and/or shoots of plant(s) either separately from the roots, or, alternatively, the plant could be processed as a whole.

It is common practice that liquids extracted from various plants are used as flavoring and coloring agents for foods and beverages, so that the present process enables economic utilization of the whole plant (i.e., by extracting more liquids from plants, in comparison to conventional methods, and by maintaining most of the original mineral richness of the various ingredients of the plants).

According to the most preferred embodiment of the present invention, the extraction of liquids from a plant, or from parts thereof, is performed by: freezing the plant, or parts thereof, e.g. by use of liquid nitrogen; crushing the frozen plant, or parts thereof, under super atmospheric pressure; allowing the crushed frozen plant, or parts thereof, to warm up to a temperature (preferably no more than 4°C) at which draining or filtering the liquids is practicable; and, draining or filtering the separated liquids from the solids residues.

Before mixing the solid residues with a carrier, diluent, adjuvant or excipien, as desired, the residual solids are preferably washed-up with a corresponding solvent, such as water or organic solvents, and the washed-up solids are subsequently subjected to homogenization and/or are freeze-dried.

Preferably, the solids residues are homogenized, and the homogenization includes comminution of the solids residues to an average particle size of no more than about 0.6 micron.

The benefits of the present invention will now be illustrated by the following non-limiting Examples:

<u>Example 1: Preparation of Solid Residues</u>

100 g of mentha longifolia L. plants were removed with their roots from the soil. After cleaning the removed plants with water, the roots and the leaves + shoots were separated (30 and 70 gr. respectively), after which they were frozen, by using liquid nitrogen, crushed and heated to 18°C. The thus-treated plants were then exposed to 6 cycles of freezing/heating, for sterilization, and liquids were separated from the solids by employing thereon high hydraulic pressure. The extracted liquids (root and shoot liquids) were removed and the solids residues were homogenized by a homogenizer to give root and shoot solids. The analysis results of mineral

content, as well as specific second metabolism components, are shown in Tables 1 and 2:

Table 1 - Distribution of Elements (other than C, H and O)

Concentration: mg/kg dry weight (for solid); mg/l (for liquid)

Element	Leaves: liquid	Roots: solid	Roots: liquid	Leaves: solid
Ag	≤0.003	≤0.6	≤0.003	≤0.6
Al	15	240	8.6	290
As	≤0.03	≤0.6	≤0.01	≤1
B	0.30	16	0.10	35
Ba	0.95	29	0.18	47
Ca	590	5100	55	15400
Cd	0.01	≤1	≤0.01	≤1
Co	≤0.02	≤2	≤0.02	≤2
Cr	0.04	15	0.08	≤2
Cu	0.34	6.5	0.21	7
Fe	12	280	6.7	290
Hg	≤0.01	≤0.4	≤0.01	≤0.4
K	970	4300	290	10400
Li	0.03	≤0.3	0.007	≤0.3
Mg	140	1515	35	2580
Mn	1.8	14	0.30	53
Mo	0.02	≤0.2	0.005	≤5
Na	85	805	55	940
Ni	0.06	5	0.04	≤2
P	90	430	24	2020
Pb	≤0.15	≤5	≤0.1	≤6
S	160	450	15	2300
Se	0.12	≤0.5	0.06	≤4
Si	37	515	18	670
Sn	0.045	≤0.4	0.035	≤0.5
Sr	1.9	46	0.33	86
Ti	0.34	17	0.20	24
V	0.02	≤0.5	0.012	≤0.5
Zn	1.8	21	0.45	67

It is clear from Table 1 that most of the useful minerals are present in the solids rather than in the liquid phase, and that there are significant differences in the mineral concentrations between the roots and the leaves.

Table 2 - Distribution of Organic Components

Concentration: mg/kg dry weight (solid); mg/l (liquid) Concentration

Compound	Roots: liquid	Roots: solids	Leaves: liquid	Leaves: solids
alkene, cycloalkane, aldehyde, polycycloalkane	-	1.1	0.9	240
alkane	-	12	<0.1	8300
alcohols (C_8-C_{11})	-	-	1.8	-
esters of fatty acids	-	-	<0.1	13
Terpenes				
limonene	-	-	-	700
α,β -phellandrene	-	-	0.5	17
α,β -pinene	-	-	-	58
carene	-	-	0.1	1
eucalyptol	-	-	2.4	83
terpineol	-	-	6.2	48
p-menth-2,8-dienol (cis,trans)	-	-	<0.1	-
Limonene oxide (cis,trans)	-	-	0.3	5
borneol	-	-	1.9	-
dihydrocarveol	0.2	-	8.4	-
isopulegon	-	-	<0.1	-
carveol	-	1.1	0.3	16
dihydrocarvone	-	-	4.7	2
pulegone	-	-	0.6	18
carvone	0.3	17	110	2500
carvone oxide	-	-	0.1	4
elemene	-	-	-	260
camphene	-	-	-	11
Sesquiterpenes				
cubenol	-	-	<0.1	18
caryophylene	-	1.1	-	400
cadinene	-	-	-	170
eremophylline	-	-	-	2
calamenene	-	-	-	23
caryophyllene oxide	-	-	-	8
cadinol	-	-	-	14
propoxyphenol	-	-	<0.1	-
dimethylbenzaldehyde	-	-	<0.1	-
propoxur	<0.1	-	0.4	trace
carboximide	-	-	<0.1	-

Regarding table 2, most of the relative mass of the identified organic components was in the leaves solid phase. Moreover, the GC-MS (Gas Chromatograph Mass Spectrometer) apparatus is loaded with about

100,000 different secondary components. The fact that none of the materials identified in the leaves were found in the roots, indicates that the roots contain different components than the leaves.

Example 2: Cosmetic Composition

A cosmetic cream was prepared in known manner using 7 gr. of cosmetic diluent and 2 gr. of solids residues that were prepared from the leaves and shoots of mentha longifolia L., as described in Example 1. The solids residues had particle size less than about 0.6 micron. An exemplary cosmetic diluent comprised magnesium lanolate 1.0%, lanoline alcohol 8.0%, paraffin oil 39.0%, methyl p-oxybenzoate 0.3% and sterile demineralized water, balance to 100%. Perfume could be conveniently added, for example, 1 ml of aqueous extract of lemon grass.

Example 3: Nutraceutical Composition

1.5 gr. solids residues having a particle size less than about 0.6 micron were prepared from the leaves and shoots of mentha longifolia L. (as described in Example 1), and subjected to freeze-drying, after which they were mixed with a known pharmaceutical binder (i.e., microcrystalline cellulose) and filled into hard or soft gelatin capsules. Such a product could be useful as a source of essential minerals and other beneficial components.

Example 4: Pharmaceutical Composition

Introduction

It is known that components of the aerial parts of Rheum palaestinum have anti-platelet activity (Phytochemistry. 2000 Nov; 55(5):407-10). In the present Example, the anti-platelet activity of the Rheum palaestinum and the antioxidant activity of the labiatae were combined; that is, by obtaining solids residues from the relevant parts in the two plants, in accordance with the process disclosed herein, and mixing the two types of solids residues.

Method

0.5 gr. of solids having a particle size less than about 0.6 micron, were prepared from the leaves and shoots of basil (as described in Example 1) and mixed with 1.5 gr. of solids similarly prepared from rosemary roots and with 1 gr. Rheum Palaestinum solids (similarly prepared from the leaves). The mixture was frozen-dried and further mixed with a known pharmaceutical binder (i.e., microcrystalline cellulose), and then filled into hard or soft gelatin capsules. The final product could be exploited as potential anti-platelet, relaxant and pro-digestive agent.

As mentioned above, the present invention also provides novel sterilizing process that includes several cycles of freezing and heating of the extracted liquids or solid residues. Example 5 refers to an experiment that was made for illustrating the advantages of the novel sterilizing process over a conventional (i.e., heating-based) sterilizing process. Example 5 refers also to the effect that the novel liquids extraction process has on the final quality/vitality of sterilized liquids, in terms of bacteriological count.

Example 5: Extraction of liquids from fresh mentha leaves, and pastorization possibilies of the liquids

Introduction

Fresh mentha leaves were washed up and cleaned, after which the leaves were cleansed with Ammonium solution (0.5%), which solution is widely used in the salads industry for cleansing vegetables.

After the cleaning/washing stage, raw liquid was extracted, or separated, from the fresh leaves in two ways: (1) by utilizing a conventional way (i.e., comminuting the fresh leaves in a blender), and (2) by utilizing the novel extraction process (i.e., deep-freezing the leaves, crushing the frozen leaves, defrosting the leaves and extracting the liquids there from). For comparison purpose, the raw liquid that was obtained by using the

conventional method was kept and handled apart from the raw liquid that was obtained by using the novel extraction process.

Each type of raw liquid was, then, filtered by manually pressing the raw liquid against thin cloth, and the filtered liquid was divided into three portions. Two samples were taken from each portion, for bacterial evaluation. The two samples taken from the first portion were sterilized in conventional manner; i.e., by immersing the extracted liquid in hot water (i.e., at approximately 80°C) for two minutes. The two samples of the second portion were sterilized according to the novel process; i.e., the liquid went through three cycles of freezing (by using liquid nitrogen) and heating, in a manner described above. The two samples of the third portion were left un-sterilized, for reference.

The count of the yeast and mold was evaluated in all of the samples. The results of the experiments are shown in Table 3.

Table 3 – Novel versus Conventional Sterilization Process

Sample No.	Treatment	General Count	Yeast	mold	Average Total Count	% From Control
1,2	blender-comminuting (for Reference)	170,000 130,000	15,000 7,800	<10 <10	150,000	100%
3,4	blender-comminuting, & sterilizing with hot water for 2 minutes	1000 400	<10 <10	<10 <10	700	0.5%
5,6	blender-comminuting & 3 cycles of freezing/defrosting	130,000 110,000	1,300 1,400	<10 <10	120,000	80%
7,8	Comminuting	48,000	40	<10	44,500	29.6%

	using Liquid Nitrogen	41,000	60	<10		
9,10	Comminuting using Liquid Nitrogen & sterilization period with hot water	120 140	<10 <10	<10 <10	130	0.08%
11,12	Comminuting using Liquid Nitrogen & 3 cycles of freezing/defrosting	6500 27,000	<10 <10	<10 <10	16,500	11%
13,14	Comminuting using Liquid Nitrogen & 6 cycles of freezing/defrosting	7,300 2,900	<10 <10	<10 <10	5,100	3.4%

Referring to samples 1 and 2 in Table-3, after crushing the plants by blender (i.e., the conventional way), the average total count of yeasts was 150,000. However, after crushing the plants according to the novel way (see samples 7 and 8); that is, by crushing the plants after freezing them, and extracting there from the liquid, the average total count was 44,500 total count and no yeasts were found (a 70.4 % decrease in the bacteria count, samples 7 and 8).

Referring to samples 11 and 12, in Table-3, the plants were frozen, crushed, and the liquids extracted there from undergone sterilization process that included three cycles of freezing/defrosting, after which the total count was 16,500 (a 89% decrease, samples 11,12).

Referring to samples 13 and 14, in Table-3, the plants were frozen, crushed, and the liquids extracted there from undergone sterilization process that included six cycles of freezing/defrosting, after which the total count was only 5,100 (96.6% decrease), with no yeasts.

The lowest count (i.e., 130, see samples 9 and 10) was obtained when the plants were frozen (i.e., with liquid nitrogen) and crushed, and the liquids extracted there from was sterilized by exposing the liquid to short heat treatment. However, it is known that utilization of heat in the sterilization process deteriorates the quality of the product, because the heating treatment tends to destroys most of the useful ingredients contained therein.

The separation and sterilization processes, as disclosed in the present invention, have proved to have the following advantages:

1) Being a major step in both the separation process and in the sterilization process, utilization of liquid nitrogen to freeze the plant of interest resulted in a dramatically reduced oxidation of the resulting treated plant(s), due to the replacement of oxygen environment by nitrogen environment;
2) In the freezing-oriented separation and sterilization processes, there was only minor evaporation of aromatic substances, and, therefore, much of the aroma was sustained.

Therefore, the experimental results demonstrate that the novel crushing method indeed can profitably replace both the conventional crushing process, and the conventional sterilization process. By freezing the plants prior to the crushing stage, and by replacing heat sterilization by freezing treatment (i.e., 'cold sterilization'), the vitality of the solids residues and liquids extracted there from, is essentially sustained.

While particular embodiments of the invention have been particularly described hereinabove, it will be appreciated that the present invention is not limited thereto, since as will be readily apparent to skilled persons, many modifications or variations can be made. Such modifications or variations which have not been detailed herein are deemed to be obvious equivalents of the present invention.

CLAIMS

1. Process for separating between, and sterilizing the, liquids and solid substances of whole plants or selected parts of plants, comprising:

a) fast deep-freezing said whole plant(s) or parts thereof;
b) crushing the deep-frozen whole plant(s), or parts thereof, thereby obtaining bioextract mixture;
c) defrosting said bioextract mixture so as to allow draining the liquids from the defrosted bioextract mixture; and
d) separating between the liquids and the solid substance of the defrosted bioextract mixture.

2. Process according to claim 1, wherein the separated liquids are further filtered and sterilized, the sterilization comprising employment of one or more "freeze-defrost" cycles, each cycles including one fast deep-freezing of the liquid(s) followed by one fast defrosting of the frozen liquid(s).

3. Process according to claim 1, wherein the separated solids substances are further homogenized, the homogenization being effected by comminuting the solid substances to an average particle size of no more than about 0.6 micron, and sterilized, the sterilization comprising employment of one or more "freeze-defrost" cycles, each cycle including one fast deep-freezing of the liquid(s) followed by one fast defrosting of the frozen liquid(s).

4. Process according to claims 2 or 3, wherein in each freeze-defrost cycle, the liquids/solids substances are kept frozen in a temperature within the range $-160^{\circ}C \div (-197^{\circ}C)$ for a period of 10 seconds, after which the frozen liquids/solids are fast defrosted to a temperature within the range $15^{\circ}C \div 20^{\circ}C$, by immersing them in hot liquid, the initial temperature of which is between $80^{\circ}C$ and 90 $^{\circ}C$.

5. Process according to any of claims 2 to 4, wherein in each cycle of the sterilization process, the liquids/solids substances are frozen by utilizing liquid nitrogen.

6. Process according to any of the preceding claims, wherein the sterilized liquids and solids substances are utilized as ingredients in cosmetic, food, nutraceutical and pharmaceutical compositions by mixing them with at least one intermediator;

7. Process according to claim 6, wherein the intermediator is an option.

8. Process according to any of the preceding claims, which is further characterized by at least one of the following features:
   a) At least one of the plants belongs to the labiatae family;
   b) At least one of the plants is selected from the group of: Lavandula, Melissa, Mentha, Ocimum, Origanum, Preslia, Rosmarinus, Salvia, Thymus;
   c) Leaves and/or shoots of the plant(s) are processed together with, or separately from, roots thereof; and/or
   d) The mixing stage is preceded by washing the solids residues with a solvent selected from water and organic solvents, and the washed solids residues are subjected to homogenization and/or dehydration by freezing.

9. Process according to any of the preceding claims, which process being utilized for making cosmetic, food, nutraceutical or pharmaceutical compositions, by: removing the liquids from whole plants, or parts of plants, after separating between the liquids and solids substances thereof, and mixing the residual solids substances, in particular the cell wall, with at least one cosmetically or pharmaceutically acceptable carrier, diluent, adjuvant or excipient

10. Process according to any of claims 1 to 8, wherein the separated liquids and/or solid substances are utilized for making a beverage, by mixing the liquids and/or solids with at least one intermediator.

11. Process according to claim 10, wherein the intermediator is an option.

12. Cosmetic, food, nutraceutical or pharmaceutical composition, which comprises a natural mineral-rich plant tissue(s) component(s), which are obtainable by: deep-freezing whole plant(s) or parts thereof; crushing the frozen whole plant(s) or parts thereof until they become a powder that has particles' size within the range of 0.5-2 micron; defrosting the crushed product so as to allow draining liquids from the resulting bioextract; separating between said liquids and the solid substance(s) of the bioextract; and, mixing the solid substance(s) together with at least one acceptable carrier, diluent, adjuvant or excipient.

13. Composition according to claim 12, wherein at least one of the plants, utilized for making said composition, belongs to the labiatae family.

14. Composition according to claim 12, which includes at least one plant selected from Lavandula, Melissa, Mentha, Ocimum, Origanum, Preslia, Rosmarinus, Salvia and Thymus.

15. Composition according to claim 12, to which chlorophyll is added for protecting a skin.

16. Composition according to claim 12, wherein the solid substance(s) are homogenized by comminuting the solid substances to an average particle size of no more than about 0.6 micron, and sterilized, the sterilization comprising employment of one or more "freeze-defrost" cycles, each cycle including one fast deep-freezing of the liquid(s) followed by one fast defrosting of the frozen liquid(s).

17. Composition according to claim 16, wherein in each freeze-defrost cycle, the tissues are kept frozen in a temperature within the range $-160^\circ C \div (-197^\circ C)$ for a period of 10 seconds, after which the frozen liquids/solids are fast defrosted to a temperature within the range $15^\circ C \div 20^\circ C$, by immersing them in hot liquid, the initial temperature of which is between $80^\circ C$ and $90\ ^\circ C$.

18. Composition according to any of claims 16 to 17, wherein in each cycle of the sterilization process, the tissues are frozen by utilizing liquid nitrogen.

19. Process according to any of the claims 1 to 11, wherein the solids and liquids of plants, or of selected parts of plants are utilized as natural colorants, flavors and/or aromatics.

20. Composition according to any of the claims 12 to 19, wherein the tissues are utilized as natural colorants, flavors and/or aromatics.

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